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1. DESCRIPTION OF ACQUISITION

A. Rational for Revision

This document has been revised as a result of dialog with national representatives of the marine community and with the local users of the Lower Mississippi River.

B. Required Missions

Title 14 U.S.C. requires the Coast Guard to safeguard the nation's ports, waterways, port facilities, vessels, persons, and property in the vicinity of the port, from accidental or intentional destruction, damage, loss, or injury. In the course of conducting Port Safety and Security, Marine Environmental Response and Waterways Management Missions, the Coast Guard is responsible for vessel traffic management and navigation safety regulations.

C. Mission Need

In order to meet our statutory responsibility for promoting safety of life and property, the Coast Guard employs a variety of vessel traffic management measures in U.S. ports and waterways. Properly employed, these tools facilitate safe vessel movements and reduce the risk of collisions, allisions and groundings and help to prevent the losses (lives and property) and environmental damage which can result from incidents of these types. An additional incidental benefit of proper use of vessel traffic management tools is that port throughput, and the resulting economic benefits, can be increased.

Characteristics of a port which is “safe” from a vessel traffic management perspective are the mariners have access to timely, relevant and accurate information which is sufficient to support proper decision making and that there are mechanisms in place to ensure or enforce good order and predictability on the waterway. Not all threats to safety on a given waterway; for example, the possibility of sudden loss of steering or propulsion, can be eliminated by vessel traffic management measures. Even in many of these instances, however, vessel traffic management tools may play a role in mitigating a portion of the negative consequences.

In a port which is “safe” from a vessel traffic management perspective, the available tools have been properly selected and used so as to effectively address the vessel traffic management and safety issues created by the specific attributes of that port. Included among the possible vessel traffic management tools are aids to navigation, regulated

navigation areas, traffic separation schemes, inland and international collision avoidance rules (the so-called rules of the road), anchorage regulations, compulsory pilotage (a responsibility shared with the states) and other measures.

An additional measure, appropriate for the most demanding situations, is the establishment of a vessel traffic service which provides traffic information services, traffic organization services and/or navigation assistance through a shoreside organization and its related information gathering, management and dissemination systems and communications capability. This Mission Need Statement addresses this highest order vessel traffic management capability.

Additional public needs can be met if the VTS capabilities are fully integrated with other Coast Guard missions and responsibilities. These include search and rescue, maritime law enforcement, environmental protection, anchorage administration, aids to navigation, merchant marine safety and port security.

1. Functional Tasks. The tasks embodied by vessel traffic management, which are common to command and control systems, can be categorized into three general areas:
 - a. Data collection. Assemble a comprehensive picture of the maritime situation through adequate sensors and information sources.
 - b. Data evaluation. Interpret the developing maritime situation.
 - c. Data dissemination. Communicate pertinent elements of the maritime situation to vessels and other shore-based organizations.
2. The Operational Capabilities required to accomplish these interrelated VTS functions are described in section 2.B.5.

D. Statutory and regulatory authority

The primary missions supported by Vessel Traffic Services are found in the following statutes:

1. **Ports and Waterways Safety Act of 1972 (PWSA).** Public Law 92-340, 33 U.S.C. §§ 1221-1233, expanded Coast Guard jurisdiction over all vessels using U.S. ports and authorizes the Coast Guard to establish, operate and maintain vessel traffic services for ports harbors and other waters subject to congestion vessel traffic.
2. **The Port and Tanker Safety Act of 1978 (PTSA)** Public Law 95-474,

which amended the PWSA, 33 U.S.C. §§ 1221-1233, provided the Coast Guard with broader and more explicit authority. The act addresses improvements in supervision and control over all types of vessels, both foreign and domestic, operating in U.S. navigable waters and in the safety of all tank vessels.

3. **The Oil Pollution Act of 1990 (OPA 90)** Public Law 101-380, which further amended the PWSA, 33 U.S.C. §§ 1221-1233, enhanced the authority of the Coast Guard to regulate the conduct of oil tankers and merchant marine personnel and to construct, operate, improve, or expand vessel traffic services. The act mandates participation by appropriate vessels operating in a VTS area.

4. **Vessel Traffic Services Regulations**, 33 CFR Part 161, establishes Coast Guard authority to include communications, vessel operations, and navigation restrictions.

5. **Bridge to Bridge Radiotelephone Act**, Public Law 92-63, 33 U.S.C. § 1201-1208, requires certain vessels to carry a radiotelephone on the navigation bridge, to be used to communicate movement intentions to other vessels. Implementing regulations by the Coast Guard and Federal Communications Commission (FCC) designated VHF-FM Channel 13 (156.65 MHz) and Channel 67 (156.375 MHz) as bridge-to-bridge frequencies and established technical requirements and penalties for noncompliance with the Act or Regulations.

6. **Navigation Rules.** The Navigation Rules, International-Inland, have the primary purpose of preventing collisions between vessels. Enforcement authority for these rules is vested in the U.S. Coast Guard. With respect to the International Rules, enforcement authority is currently limited to actions pursuant to Section 4450, Revised Statutes of the United States (46 U.S.C. Chapter 77).

7. **Anchorage Regulations**, 33 CFR Parts 109 and 110, regulate how federal anchorages may be used. The Coast Guard is charged with enforcing these regulations.

2. RATIONALE FOR ACQUISITION

A. Current Capability.

1. Vessel Traffic Services provide the following public services:
 - a. Routine traffic information services.
 - b. Information on aids-to-navigation discrepancies, safety zones, security zones, marine events, and Captain of the Port (COTP) orders.
 - c. Advisories on unexpected or hazardous conditions.
 - d. Weather advisories.
 - e. Traffic organization.
 - f. Relay of communications.
 - g. Relay of requests for assistance.
 - h. Assistance in establishing communications between vessels and between vessels and shoreside organizations.
 - i. Anchorage administration.
 - j. Navigational assistance.
 - k. Notification to the COTP and allied services of matters relating to maritime/port safety.
2. Most VTS operations are personnel intensive and depend exclusively on voice communications:
 - a. VTS operators use radar, closed circuit television (CCTV), and limited automatic identification systems (AIS) supplemented by voice radio reports. Radar video displays must be constantly monitored by trained, experienced operators.
 - b. Surveillance coverage is limited in some VTS Areas of Responsibility (AORs). Coverage is sometimes hampered by inclement weather conditions.
 - c. Tracking the position of obstructions to navigation, hazardous materials and anchored vessels is done manually.
 - d. Incidents are detected and monitored using manual systems.

- e. In many cases information is transferred to paper charts, notecards, and tracking boards. Operators must search through paper files to retrieve information, extract and copy it by hand to usable formats, and manually record all vessel movement data.
- f. Information services are primarily provided by voice radio.
- g. System limitations sometimes delays the passage of complete traffic information when desired by the mariner.
- h. Traffic organization service is provided by coordinating traffic order to avoid congestion and promote optimal use of port resources.
- i. In most cases, vessel information, track data, communications, and other maritime activity is recorded, archived and retrieved manually. This makes it difficult to subsequently access documentation of vessel traffic incidents for analysis, reporting, or support of investigations of suspected navigational violations.
- j. Ship - shore communications are primarily conducted through voice radio, contributing to the congestion of the VHF-FM maritime band.

B. Planned Capability.

- 1. National and local level dialogs have been conducted by the sponsor to ascertain the needs of a wide variety of stakeholders. Results of those dialogs have indicated a shortfall in current VTS capabilities. This position supports the Coast Guard's 1991 Port Needs Study (PNS), which demonstrated a potential net benefit of \$254 million from installing a VTS in New Orleans. Project Manager market surveys indicate that these benefits can be attained by using off-the-shelf technologies.
- 2. The quality of information received and broadcast by the VTS must be improved. Automating manual and voice-based systems will reduce error and enhance safety. In addition, the automation of administrative and management functions, will greatly improve the operator's ability to provide rapid and accurate advisories to the maritime public. The critical operational and information systems should be uninterrupted and available continuously, with no single point of failure. Communication systems should be configured to provide alternate routing.
- 3. Accurate detection, tracking and monitoring will result in a more effective traffic organization service. Improved coordination of traffic will prevent congestion and promote optimal use of port resources. Dissemination of vessel routing measures will be automated where practical.

4. VTSs need to provide multi-mission capabilities with improved interoperability and cross-functionality between VTS and allied services through the mutual exchange of related data.
5. The following capabilities are required at all existing and future VTSs:
 - a. Acquire vessel position, identification, and sailing intentions. The media for accomplishing this should include a foundation for automatic voiceless reporting of vessel movement information.
 - b. Acquire and provide oceanographic and meteorological information.
 - c. Provide continuous, all-weather surveillance of mandatory participants
 - d. Monitor federal anchorages.
 - e. Monitor the status of selected vessels in port and all anchored vessels.
 - f. Monitor the status of obstructions or restrictions to navigation.
 - g. Monitor incidents.
 - h. Integrate data from multiple sources into a composite display; processing data from external and internal sources.
 - i. Provide information to vessels and shore-based organizations. This service includes information on relevant traffic conditions, and advance warning of identified hazardous conditions.
 - j. Provide support for allied services.
 - k. Provide navigation assistance service to vessels when requested.
 - l. Provide traffic organization service by coordinating traffic order to avoid congestion and promote optimal use of port resources.
 - m. Communicate with vessels, agencies and industries concerned with maritime traffic and the safety of vessels or facilities using data transmission techniques other than voice communications on the VHF-FM maritime band. Reduce or eliminate voice communications.
 - n. Improve accuracy, timeliness, automation, and level of detail.
 - o. Capacity to expand areas of responsibility to accommodate changes in traffic patterns, traffic surges, special events or contingency response.

- p. Automatically record and archive vessel information, track data, communications, and other maritime activity to facilitate necessary information recovery for analysis and reporting. Store and index data for rapid retrieval and display for accident analysis, archiving, and information management. Provide documentation of vessel traffic incidents, and support investigations of suspected navigational violations.

C. Alternatives to be considered.

1. No control or monitoring of vessel traffic. This would include decommissioning the existing VTSs. Statutory obligations and prudent maritime safety considerations preclude this alternative.
2. Maintain the technical status quo with existing and any future VTSs. This technical approach is personnel intensive and relies on voice communications to send and receive information.
3. The preferred alternative incorporates off-the-shelf modular design and open systems principles, to satisfy mission needs in response to dialogue with local port stakeholders. Pursuing this approach will necessitate the evaluation of subsequent alternatives: level of automation, mix of active and passive traffic management schemes, level of authority to be exercised, degree of multi-mission integration, degree of integration among VTSs and the mix of independent and dependent surveillance resulting from local port user needs.

D. Risks.

1. Cost Risk: Medium. Off-the-shelf technology and open architecture will be used extensively where possible, along with standardized equipment modules to control costs. Utilizing off-the shelf systems with existing software will minimize the need for extensive software development.
2. Schedule Risk: Medium. Greatest schedule risk is associated with remote site acquisition which is impacted by local environmental concerns. Some additional risk is associated with identifying local user needs and development of port specific software where required.
3. Technical Risk: Medium. By using off-the-shelf technology, extensive software development will not be necessary to meet operational requirements. Difficulties might be encountered in obtaining exclusive use of a dedicated frequency for AIS.

E. Acquisition strategy objectives.

1. The acquisition will be conducted through open competition between vendors with proven off-the-shelf systems meeting minimum criteria. Developmental items are not being considered for this project and only minimum configuration changes will be considered to meet operational requirements.
2. The acquisition strategy for accomplishing the VTS mission will emphasize the implementation of VTS systems while accomplishing three primary objectives:
 - a. Establish new VTSs in concert with port users/stakeholders based on demonstrated needs and funding availability. Identification of candidate ports for the installation of new VTSs will consider the following factors:
 - What existing local navigation management systems are in place and how effective are they?
 - What are the existing or likely future conditions in the port with respect to traffic density, traffic patterns, and complexity of traffic or vessel movements?
 - What are the sizes, types, and numbers of vessels operating in the port area?
 - What is the history (including the causes) of accidents, casualties, pollution incidents, and other safety problems within the port area?
 - What are the physical limitations of the port?
 - What types and amounts of hazardous or environmentally sensitive cargoes are transported within the port?
 - What are the prevailing conditions and extremes of weather and oceanography in the port?
 - What are the environmental, safety, and economic consequences of having or not having a VTS within the port?

- b. Ensure that all resulting VTS systems provide improved interoperability and cross functionality between VTS and other external sources through the mutual exchange of information to accommodate new or changing operational requirements as well as technology growth.
 - c. Retrofit the existing Vessel Traffic Services when their equipment suite becomes technically obsolete or insupportable.
- 3. Local stakeholder commitment is absolutely necessary for VTS siting consideration in any port. Formal public-private partnerships will be pursued in ports and waterways that have, or are intended to have, a VTS. The degree to which each partner will contribute to the design, installation and operation of each VTS will be determined on a port by port basis. Federal funds should only be used to support VTS capabilities required to address locally validated safety needs. Capabilities beyond the basic elements of VTS should be funded outside the federal government.
- 4. All VTSs will be assembled from a set of module-based, standard configurations. These configurations will, to the greatest extent possible, be compatible with other Coast Guard-wide information and command and control systems where they are separate entities in addition to information systems within a port (e.g. mariner exchange, port authority, pilots). This will ensure unobstructed flow of information between systems providing instant access while minimizing duplication of systems.

3. IMPACT OF DISAPPROVING ACQUISITION

A. Existing capability and resources.

1. Most existing VTS systems have limited capability and cannot accommodate changing requirements and voiceless communications without major modifications. Some systems are approaching technical obsolescence and the risk of service interruptions is increasing. Larger vessels and increased levels of port congestion necessitate an automated, centralized waterway management system. Overall waterway safety can be enhanced by the introduction of automatic identification systems and decision support tools.
2. Current legislative intent is to have the capability to decrease the risk of environment-threatening incidents. The Port Needs Study articulated the benefits of VTS in terms of avoided vessel casualties and consequences such as loss of human life, cargo loss, spill clean up costs, environmental impact, and property damage. Analysis done in the Port Needs Study resulted in a predicted benefit of \$778,365,000. Use of ship to ship and ship to shore AIS as a collision avoidance and traffic organization tool is expected to result in a greater benefit, in both VTS and non-VTS areas, and at a lesser cost than for other, more traditional VTS design concepts.
3. Coast Guard customers will not realize the benefits of shared information. Existing surveillance, communications, and data storage systems are not part of a universally applied, standards-based architecture, and required interoperability is not provided.

B. Constraints.

1. Operational. VTSs must continue to function without interruption. Surveillance systems will continue to be supported and repaired. There must be a smooth transition from old to new technologies. Existing systems must remain in place and operational during a transition phase to permit operators to develop familiarity and confidence in the new systems.
2. Technical. As new surveillance, communications, and data storage systems are acquired (in multiple stages) interoperability must be maintained.
3. Scheduling. The VTS program has a high degree of visibility because of Congressional and public interest in protecting the environment. This is reflected in the Coast Guard's desire to acquire and operate quality VTS systems using modern, affordable technology. It is important to begin planning now to bring new VTSs on-line. Early planning and implementation will obviate the prospect of imposed mandates.

C. Potential Opportunities.

1. Development of new ship to ship and ship to shore AIS to meet maritime safety and environmental protection missions will provide significant benefits to the Coast Guard. Its application as a powerful collision avoidance aid will render significant benefits to the users. AIS based systems will also:
 - a. Replace personnel-intensive surveillance, display, and communications systems with modern technology. Display of target data on an electronic chart will present information more clearly and accurately, enabling personnel to evaluate and disseminate navigational information with less manual manipulation of data.
 - b. Use differential global positioning system (dGPS) technology. The addition of dGPS based AIS technology enhances the accuracy of vessel tracking.
 - c. Enable storage and retrieval of vessel data for accident investigation, traffic movement analysis, and report generation.
 - d. Enable re-engineering of decision support processes to obtain improved effectiveness.
 - e. Enable operators to work more efficiently with more accuracy, reducing information processing time and mistakes, increasing time available for information analysis, and thereby providing improved waterways management. Eliminate delays caused by voice communications and manual decision support operations.
 - f. Reduce Coast Guard costs through standardization and commonality of equipment, hardware, software, and training programs.
2. Widespread use of automated information technology; as compared to other, more traditional, approaches to the VTS mission, is expected to allow significant reductions in watchstander requirements with consequent reductions in life-cycle costs for personnel. Therefore, incorporating automated information technology into system design is a central goal.
3. Advances in technology and rapid changes in the products available in the electronics industry place practical limitations on the expected service lives of various components in any multi-component information processing system. Open system architecture facilitates individual component replacement when required, while allowing retention of other components and software, thus obtaining maximum service life out of each component in the larger system. For this reason, open-system architecture is a central goal.

4. RESOURCES REQUIRED

A. Resource Requirements.

1. The following funding stream is required in FY98 and FY99.

FY98	FY99
Total: \$5.5M	\$6.6M

2. Maximum funding profile. The Coast Guard will pursue outreach discussions with all ports identified in the Port Needs Study, existing ports with VTS systems, and a few select ports outside the Port Needs Study which may be considered for a VTS. Since the need for a VTS in each port is on a case by case basis, it is not feasible to identify a maximum funding profile at this time. Resource requirements will be identified incrementally based on port dialogue with local stakeholders. The initial estimate for personnel requirements beginning in FY 99 is 19 additional billets/positions. However, we expect to realize some program wide savings through implementing AIS. At this time, we are unable to predict what those savings might be. Within two years, the program will have completed outreach discussions and will have evaluated AIS technology in terms of its potential for reducing installation and operating costs. The maximum funding profile can then be determined based on the number of ports in which the users and the Coast Guard agree that a VTS is necessary and the extent to which AIS can reduce the costs of establishing and operating the VTS.

B. Acquisition costs.

Gross estimates for complete VTS facilities can only be developed after dialogue with individual ports. A gross estimate will be updated periodically based on the results of outreach discussions with local port stakeholders and a determination of the need for a VTS in a given port. Given widespread application of ship to ship and ship to shore AIS, not all ports will require the additional level of services provided by a VTS. The number of ports expected to require a VTS for safety purposes is expected to be limited.

C. Life-cycle costs.

The largest portion of total life-cycle costs are those associated with personnel. Maximum use of automated processes will reduce personnel costs.

D. Timing.

The initial operational capability (IOC) of the first port funded in FY98 is the fourth quarter of FY00.

E. Priority/affordability

New VTS systems are a top Coast Guard priority in line with the Secretary's National Transportation Policy. Retrofitting of existing VTSs is another Coast Guard priority. Establishing new VTSs in other ports would be guided by the implementation plan as supported by additional detailed waterway assessments of vessel traffic management requirements in those ports.

F. Other government agency impact.

The interoperability capability noted above will provide a beneficial impact on other agencies. For example, VTSs benefit our maritime defense posture, thus the Department of Defense is impacted. Efficient trade is enabled so the Department of Commerce is affected. Related radionavigation investments (e.g. dGPS) will benefit any agency operating mobile platforms.

5. RECOMMENDATION

- A. Approve the mission need for the acquisition of Vessel Traffic Services
- B. Retain the Vessel Traffic Services acquisition level designation as Level I under DOT Major Acquisition Policy and Procedures (MAPP).
 - 1. Grant permission to proceed to the full scale development phase.